



Please be courteous to our speakers



***Turn off all cell phones
and
Set pagers to vibrate***



June 2 -5, 2002

www.energy2002.ee.doe.gov



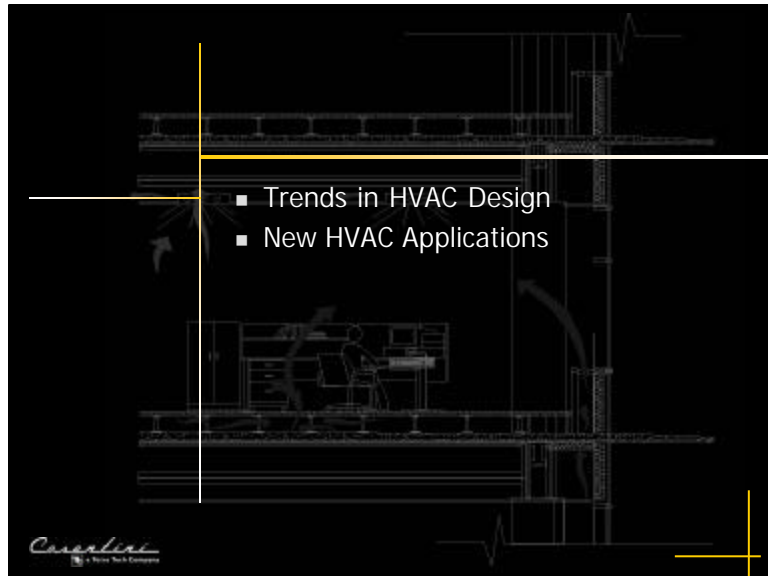
An Energy Efficiency Workshop & Exposition
Palm Springs, California

Underfloor Power & Air

Douglas Mass, PE
President, Cosentini Associates

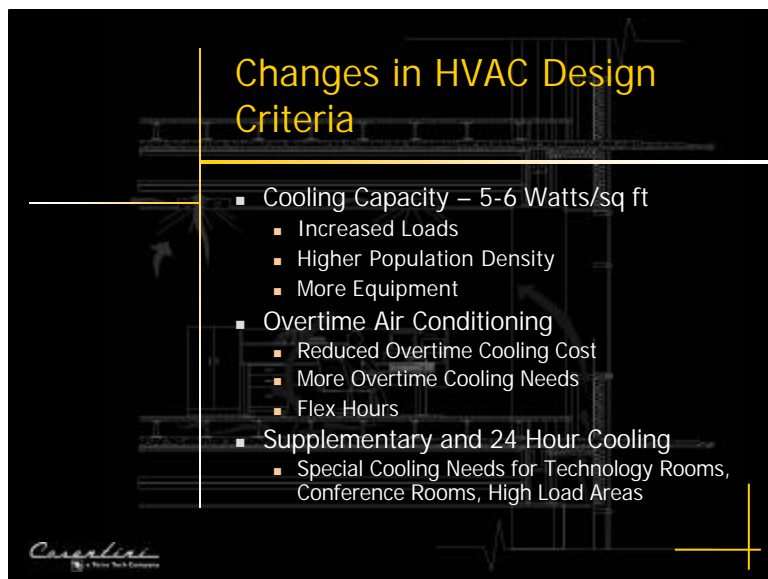
June 2 -5, 2002

www.energy2002.ee.doe.gov



- Trends in HVAC Design
- New HVAC Applications

Carrolline
A Series Tech Company



Changes in HVAC Design Criteria

- Cooling Capacity – 5-6 Watts/sq ft
 - Increased Loads
 - Higher Population Density
 - More Equipment
- Overtime Air Conditioning
 - Reduced Overtime Cooling Cost
 - More Overtime Cooling Needs
 - Flex Hours
- Supplementary and 24 Hour Cooling
 - Special Cooling Needs for Technology Rooms, Conference Rooms, High Load Areas

Carrolline
A Series Tech Company

Human Factor

- More Fresh Air
 - Recognition of Greener Buildings (LEED)
 - Accommodate Excess Air for Conference/Assembly Areas
 - Accommodate Outside Air During Overtime Hours
- Task Cooling
 - Control One's Own Environment

Carrolline
A Better Tech Experience

Recognition of Changes in Technology/Flexibility

- Changes in Technology = Changes in Load Distribution
- Development of Pathways to Deal with Load Migration
- Modifications to Physical Work Environment
- Fast, Low Cost Changes

Carrolline
A Better Tech Experience

Sustainable Design (Green Buildings)

Being Promoted by Federal & State Governments
and Private Corporations

- Environment
- Energy
- Materials
- Reuse of Resources
- Renewables
- Future Flexibility

Carrolline
A Better Tech Enterprise

LEED Building Rating Scale

Category	Maximum Points
Sustainable Sites	14
Water Efficiency	5
Energy & Atmosphere	17
Materials & Resources	13
Indoor Environmental Quality	15
Total Core LEED Rating System Points	64
<u>Innovation and Process Points</u>	<u>5</u>
Total Points Possible	69

Carrolline
A Better Tech Enterprise

Innovative Strategies for Sustainable Design

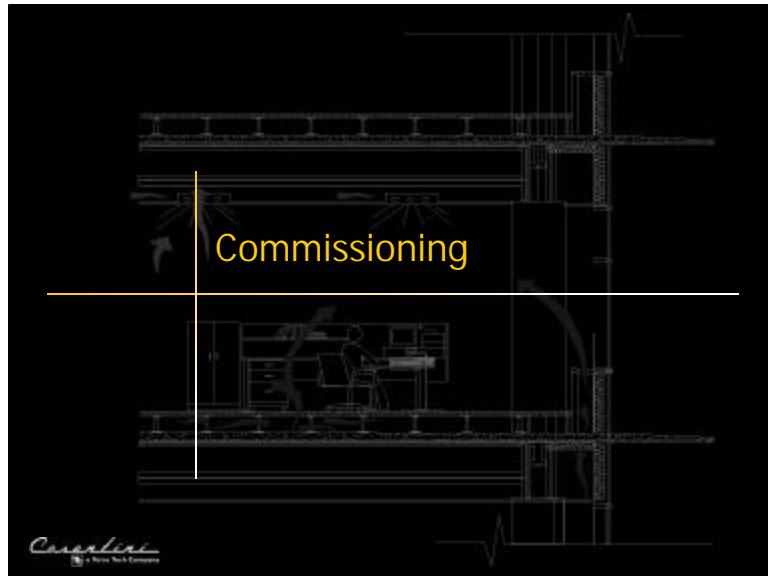
- Fuel Cells
- Dynamic Exterior Wall Systems
- Passive Single Wall Systems
- Underfloor Air Distribution System
- Natural Ventilation
- Wind Power
- Solar Power
- Geothermal
- Peak Shaving (Plant Efficiency)
- Cogeneration
- Office Equipment Power Conservation
- Photovoltaic
- Hybrid Systems

Carrolline
A Better Tech Enterprise

Building Systems Vulnerability

- Security – Physical, & Electronic
- Security of Infrastructure – Power, data, fuel supplies, etc.
- Security of Water Supply including house tanks
- Security of Air Intakes, Roofs, Machine Rooms
- Special Air Filtration – HEPA, Chemical, Biological Mitigation
- Emergency Response Plans
 - Shut Down of Air Systems
 - Purge Air in Building
 - Response to an Event inside or outside of building

Carrolline
A Better Tech Enterprise



Commissioning Goals

- Communication Between Designer & Operator
- To deliver a fully functional and verified HVAC system that complies with the design intent.
- To provide adequate training to building personnel that will allow them to properly maintain and operate these systems.
- To turn over proper documentation showing how the system was designed, installed and intended to operate.

Carrolline
A Better Tech Company

This slide has a black background with a faint architectural drawing. On the left, there is a small rectangular inset photograph showing an industrial facility with several large, green storage tanks. To the right of this image, the title 'Commissioning Goals' is written in a bold, yellow, sans-serif font. Below the title, there is a list of four bullet points, each preceded by a small yellow square. The text of the bullet points is white. In the bottom left corner, the 'Carrolline' logo is present, with the tagline 'A Better Tech Company' below it. A yellow crosshair is also visible on the right side of the slide.



Benefits

- Training and improved operator knowledge
System performance
- Reduced downtime
- Improved IAQ and comfort conditions for occupants
- Reduced number of deficiencies during construction
- Properly documented and catalogued records, as-built drawings and O&M manuals.
- Assures Operating Cost Savings

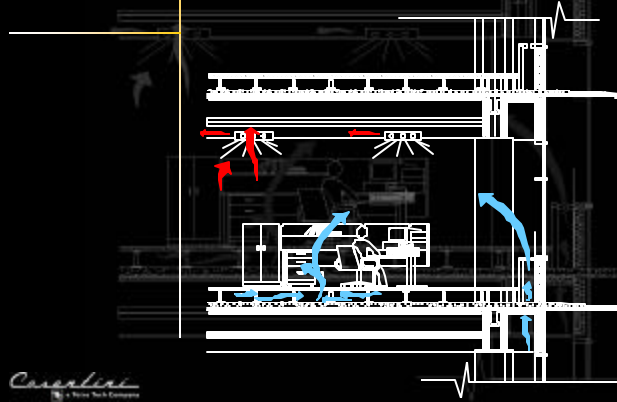
Carrolline
A Better Tech Company

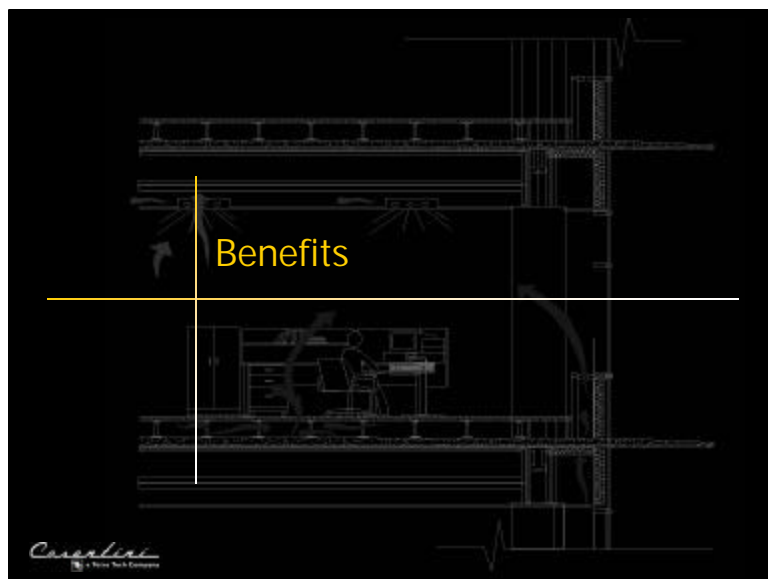


New HVAC Applications

Carrolline
A Better Tech Company

Underfloor Air Distribution Systems

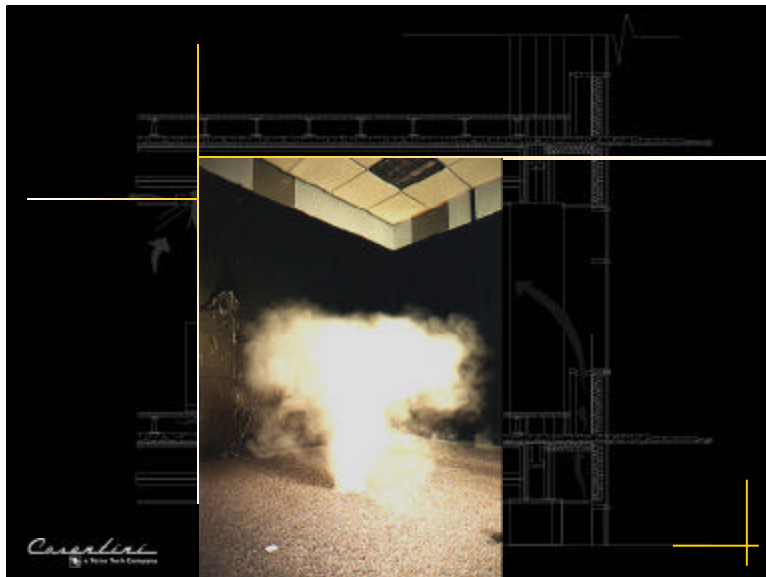




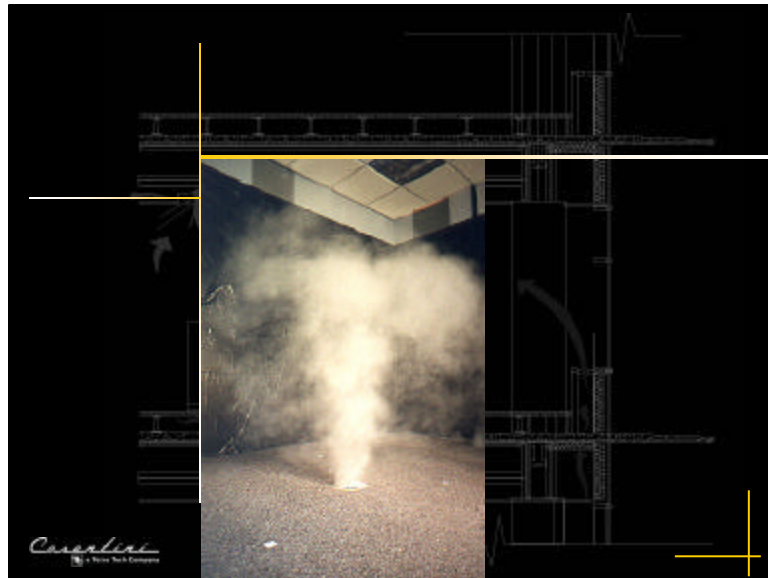
Improved Thermal Comfort

- Improved Air Movement
- Occupant Regulation of Air Flow
- Occupant Regulation of Temperature
- Improved Occupant Satisfaction
- Increased Productivity

Carrolline
A Better Work Environment



Carrolline
A Better Work Environment



Carrolline
A Better Tech Experience

Indoor Air Quality

- Increased Ventilation Effectiveness (Fresh Air)
- Cleaner Environment
- Easy Access for Maintenance of Air Stream
- Additional Air-Side Free Cooling Hours

Carrolline
A Better Tech Experience

System Flexibility

- Ability to Relocate People and Equipment Cost Effectively and Quickly
- Perfect Application for Teaming Concept
- Ability for Task Cooling
- Owens Corning Saved \$500,000 the First Year

Carrolline
A Service Tech Company



Carrolline
A Service Tech Company

5 10 '96

Energy/Operating Costs

- Reduced Energy Usage
 - Only Cool where People/Equipment are Located
 - Only Condition Heat Load in Comfort Zone
 - Higher Supply Air Temperature
 - More Free Cooling Hours
 - Reduced Refrigeration Energy
 - Lower Overall Air Circulation than Standard
 - Lower Fan Energy
- Lower Maintenance Costs (Less Devices to Maintain)

Carrolline
A Series Tech Company

Life Cycle Building Cost

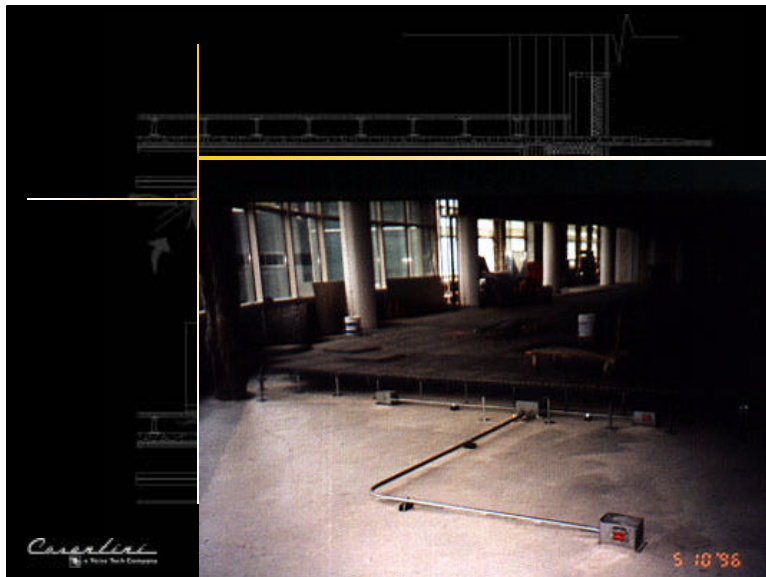
- Reduced Life Cycle Building Cost
- Lower Cost to Make Space Changes
- Reduced System Maintenance
- Lower Energy Costs

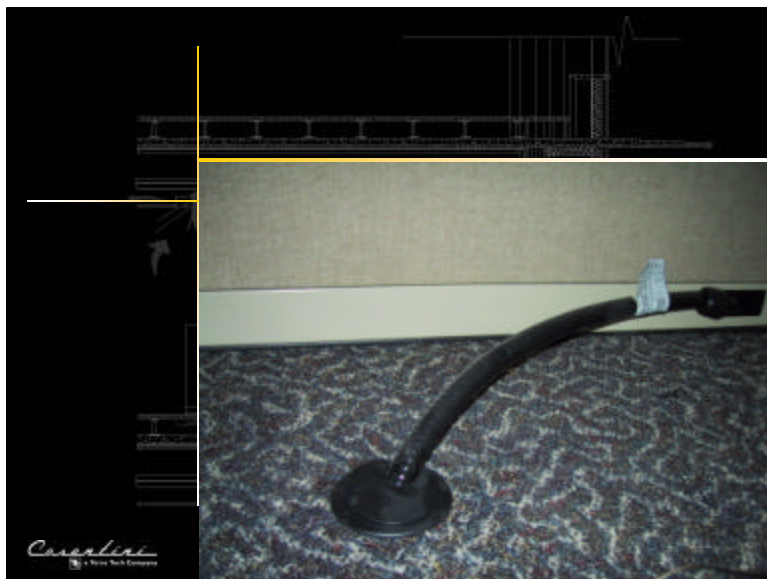
Carrolline
A Series Tech Company

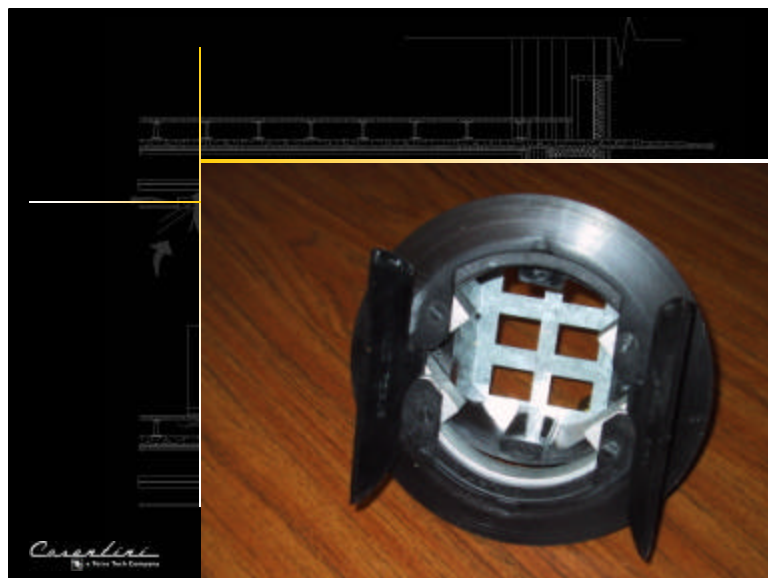
Additional Benefits

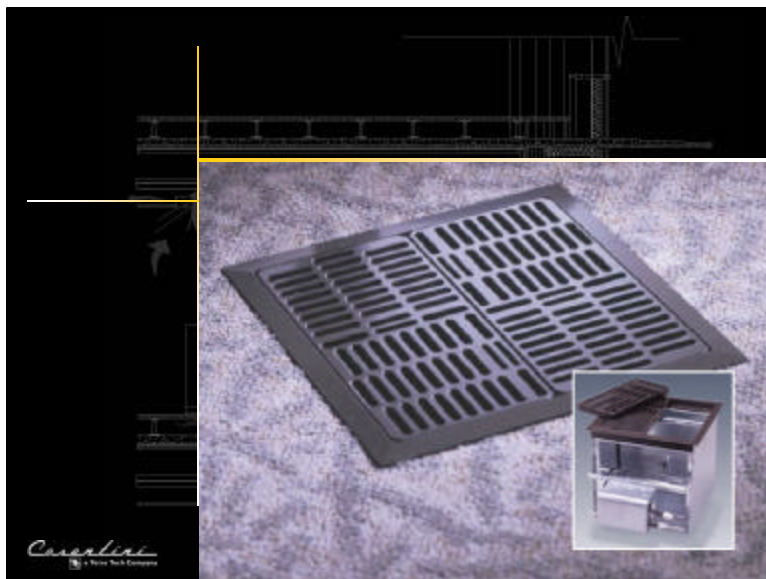
- Electro-Mechanical System Integration
- Modular Power Cabling Distribution
- Modular Data Telecommunications Distribution
- Integration with Furniture/Partition Systems

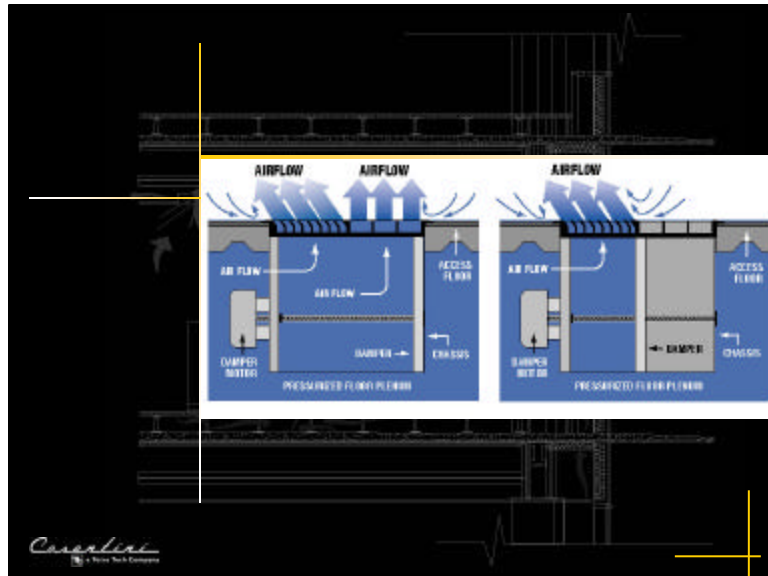
Carrollini
A Series Tech Company











FTU Operation Diagram Cooling/Heating Mode



FTU Operation Diagram Recirculation Mode



Carrolline
A Series Tech Company

Design Objectives

- Space requirements
 - Reduced Ceiling Plenum Requirements for Return Air, Sprinkler and Lighting
 - If No Ceiling, Need to Insure Heat and Contaminants are Above Occupied Zone
 - If No Ceiling and Private Office, Need to Insure Adequate Induction for Return Air
 - Raised Floor Height (10-12 Inch)

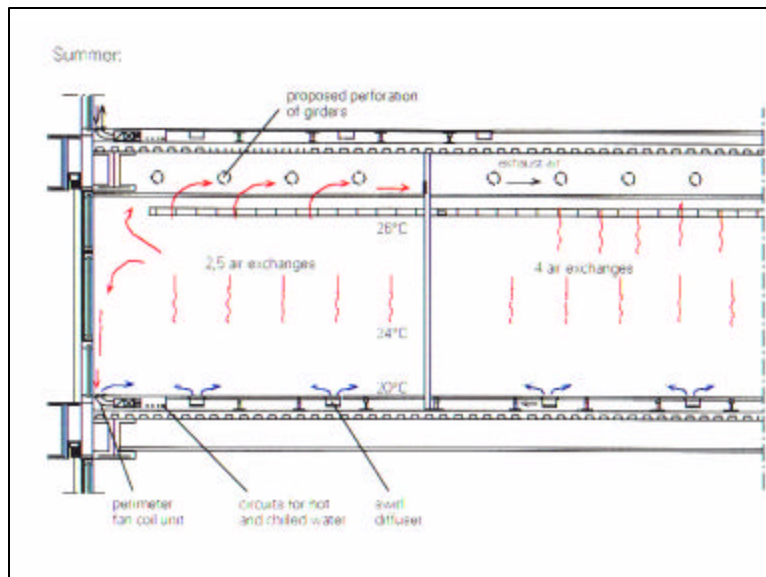
Carrolline
A Series Tech Company

Perimeter Heating/Cooling Options

■ Perimeter Heating/Cooling Strategies

- Reduced Loads
 - Curtain Wall Efficiency (Shading Coeff., U-Value)
 - Type of Shading System
- Common System
 - Use Interior Air with Booster/Static Heating,
 - Radiant, or Heating Coil
- Independent System
 - All Air VAV
 - Air/Water

Carrolline
a Nece Tech Company



General Issues

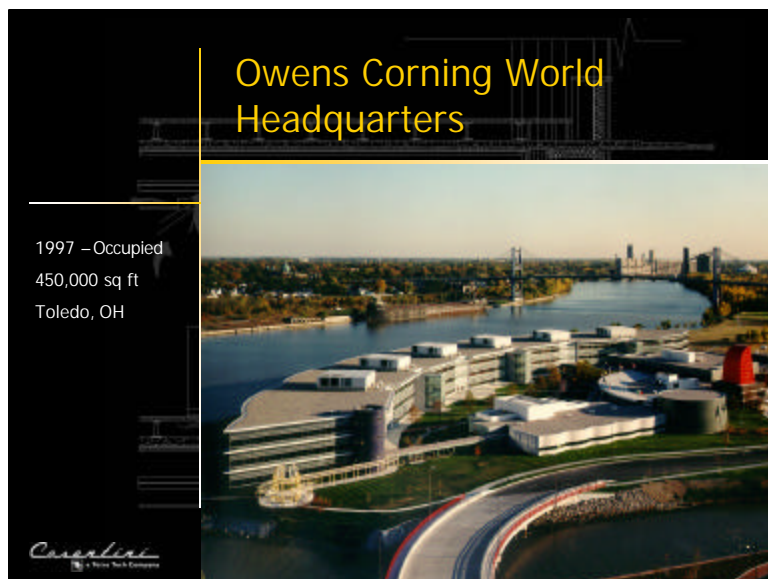
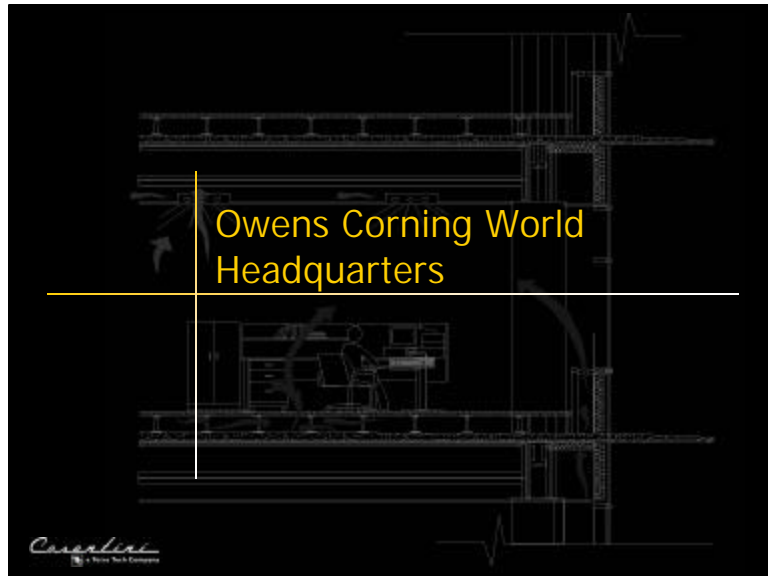
- Overtime A/C Strategy/Under Floor Partitioning
- Multiple Tenants Per Floor
- Integrated Lighting/Sprinkler Configuration Allows for Flexible Partition Relocation
- "Exiting" Strategy - Speculative Office Use

Carrolline
A Series Tech Company

Case Studies

Owens Corning
FedEx Headquarters
HA•LO
Woodfield Preserve

Carrolline
A Series Tech Company



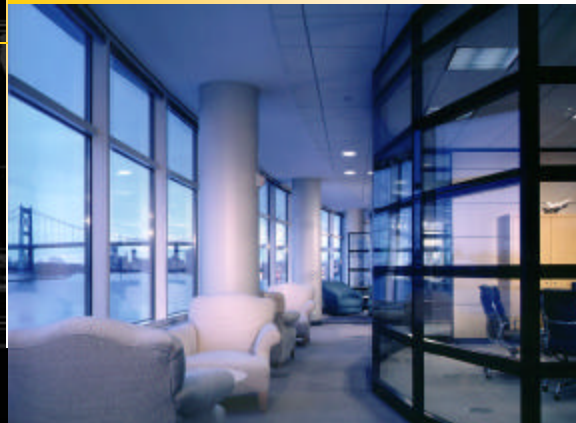
Owens Corning World Headquarters

Carrollini
A Stone Tech Company



Owens Corning World Headquarters

Carrollini
A Stone Tech Company



Owens Corning World Headquarters



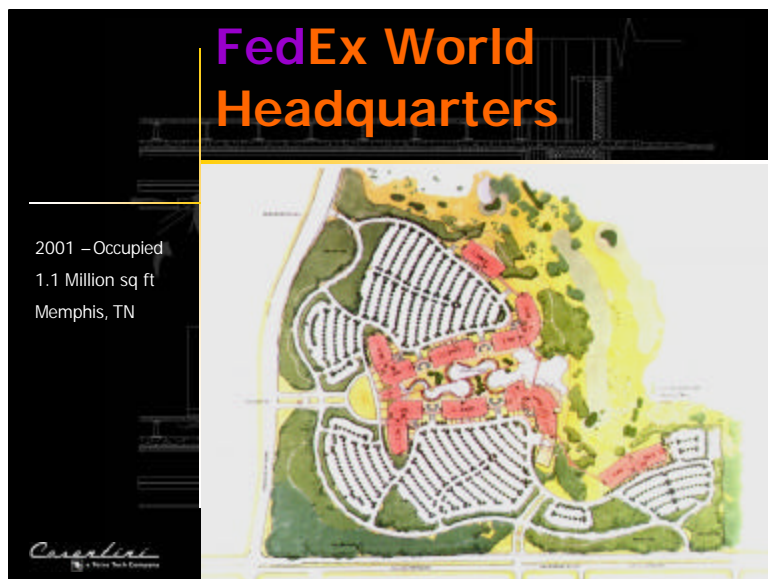
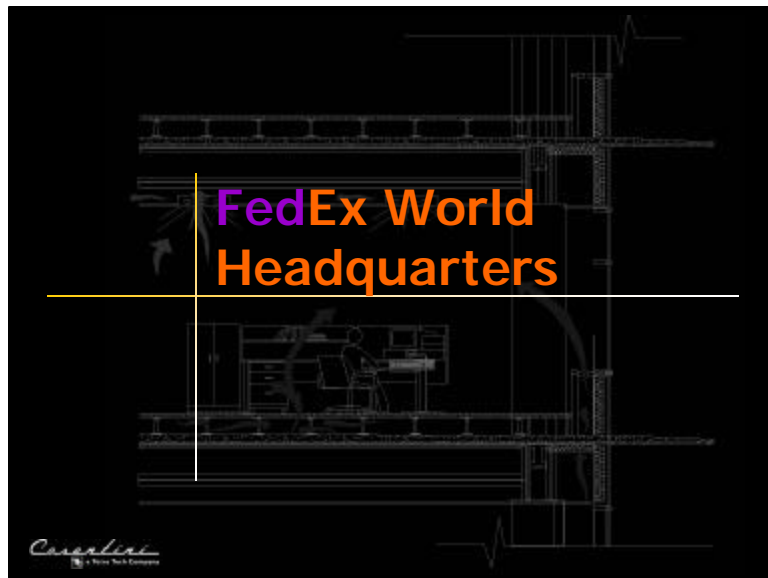
Carandini
A Neve Tech Company



"The benefits - comfortable workspace, flexibility, energy savings, and quality environment - of underfloor distribution make the system choice a true success for Owens Corning."

Jim Eckert, director of Corporate Facilities,
Owens Corning Headquarters

Carandini
A Neve Tech Company



FedEx World Headquarters



Carrolline
A Better Work Environment

The Project

- 1.1 Million Sq Ft
- 3800 Employees
- 18% Private Offices-82% Open Plan Workstations
- FedEx owned and maintained

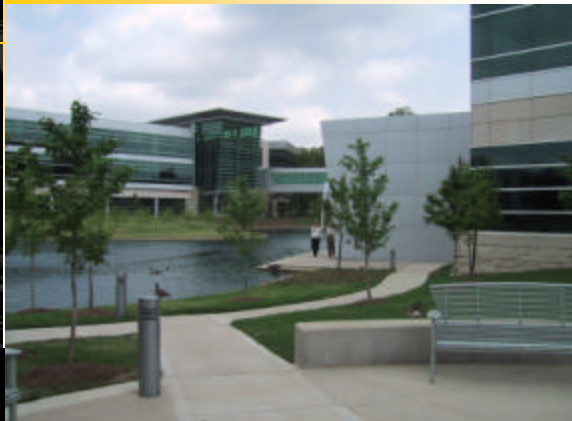
Carrolline
A Better Work Environment

FedEx World Headquarters



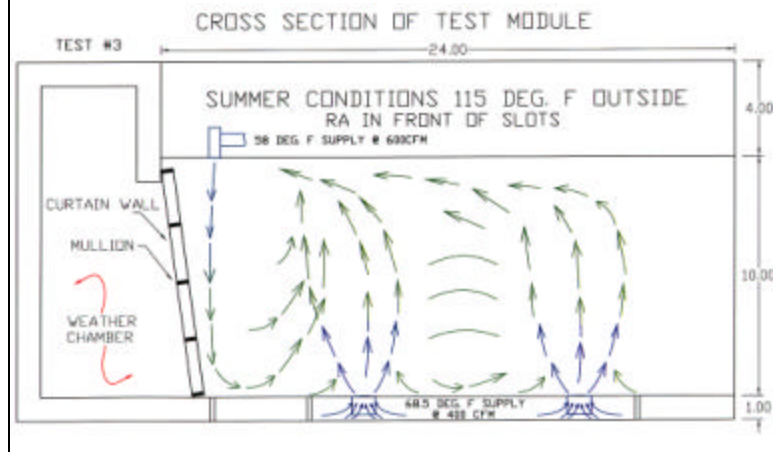
Carrollini
A Nece Tech Company

FedEx World Headquarters

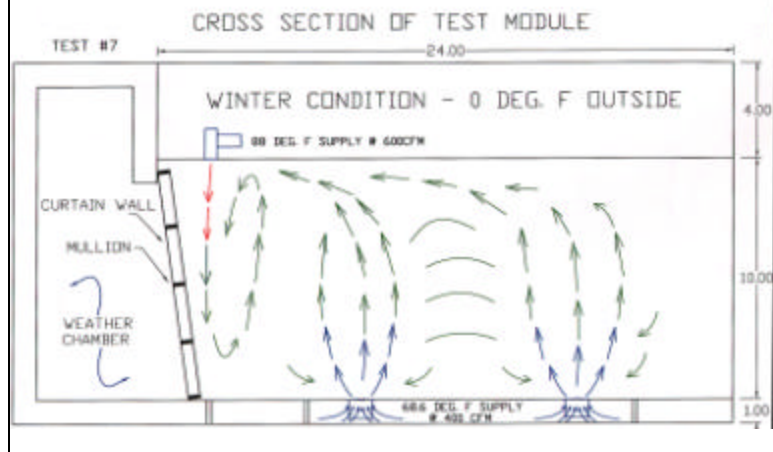


Carrollini
A Nece Tech Company

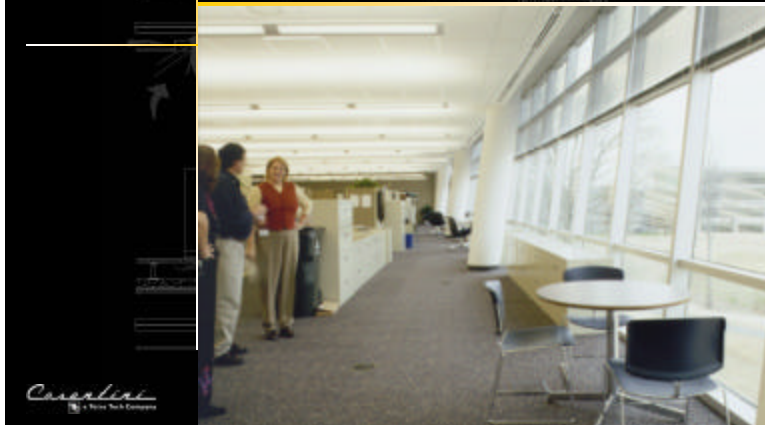
FedEx Mockup Test



FedEx Mockup Test

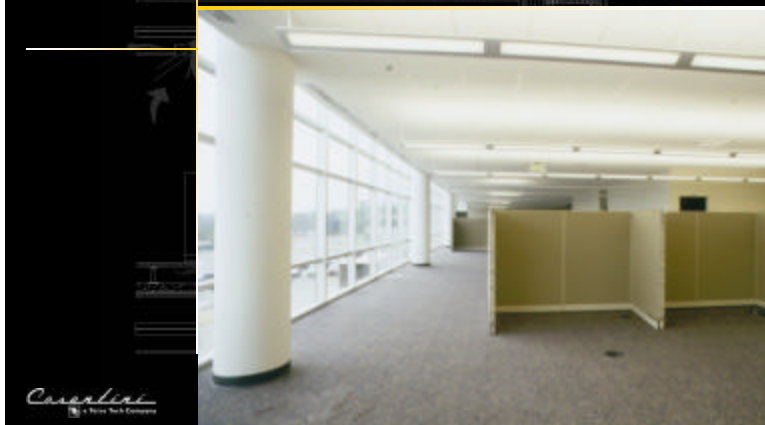


FedEx World Headquarters



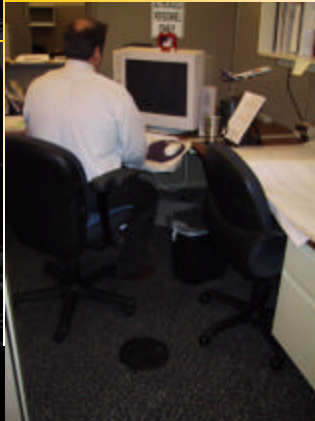
Carrollini
A Neve Tech Company

FedEx World Headquarters



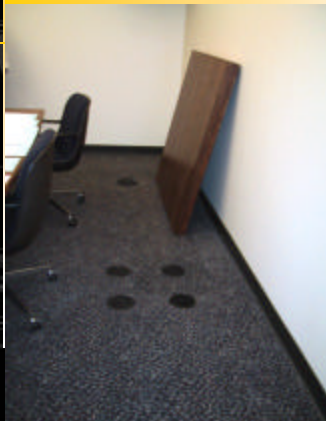
Carrollini
A Neve Tech Company

FedEx World Headquarters



Carrollini
A Service Tech Company

FedEx World Headquarters

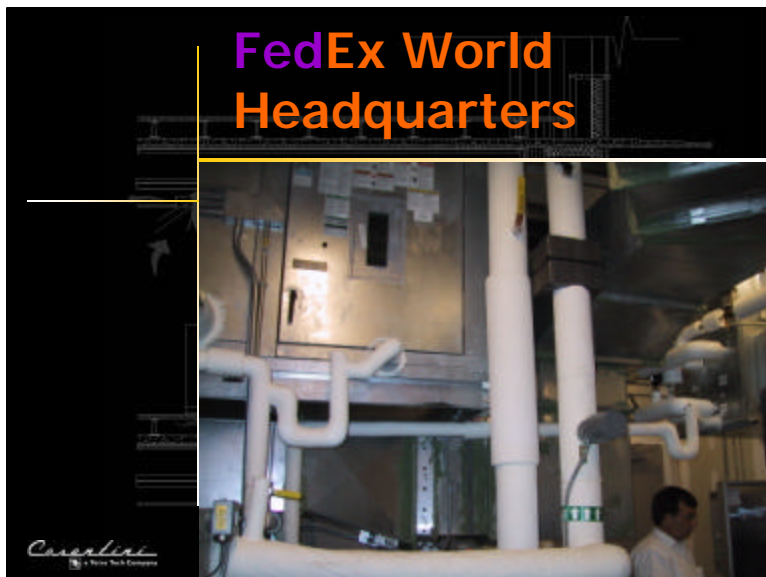


Carrollini
A Service Tech Company

FedEx World Headquarters



FedEx World Headquarters

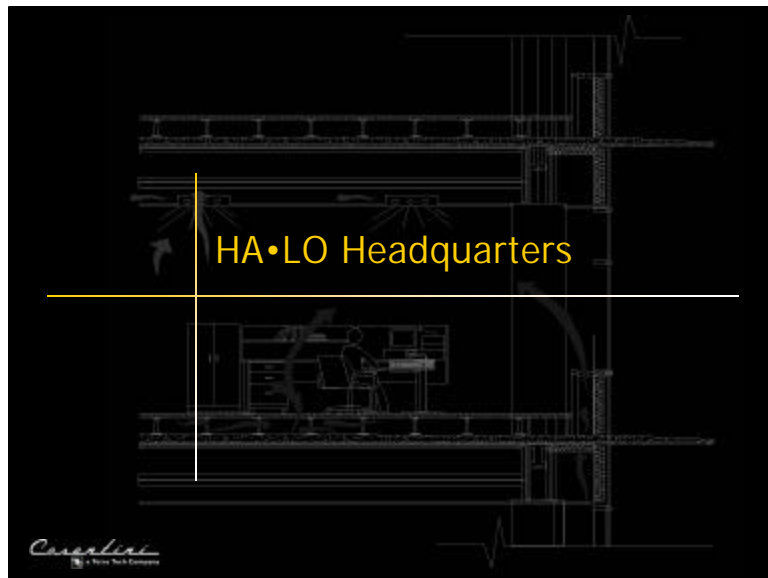


FedEx World Headquarters



FedEx World Headquarters





HA•LO Headquarters



Carrollini
A Better Tech Company

HA•LO Headquarters



Carrollini
A Better Tech Company

HA•LO Headquarters

Carrollini
A Stone Tech Company



HA•LO Headquarters

Carrollini
A Stone Tech Company



HA•LO Headquarters



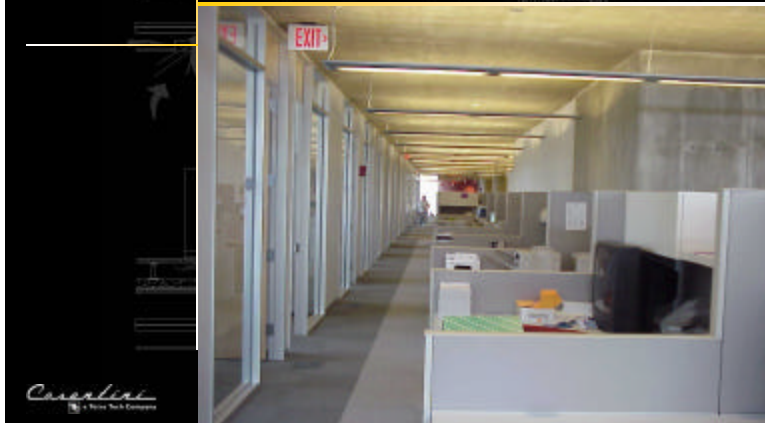
Carrollini
A Better Work Environment

HA•LO Headquarters

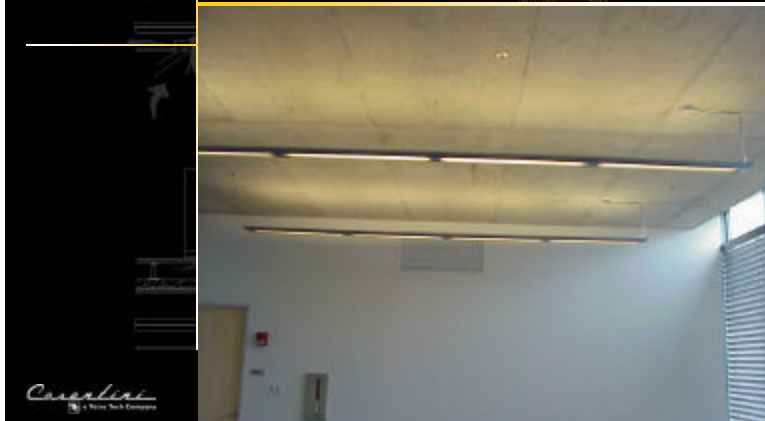


Carrollini
A Better Work Environment

HA•LO Headquarters



HA•LO Headquarters





Woodfield Preserve Office Park

Carrollini
A Neace Tech Company

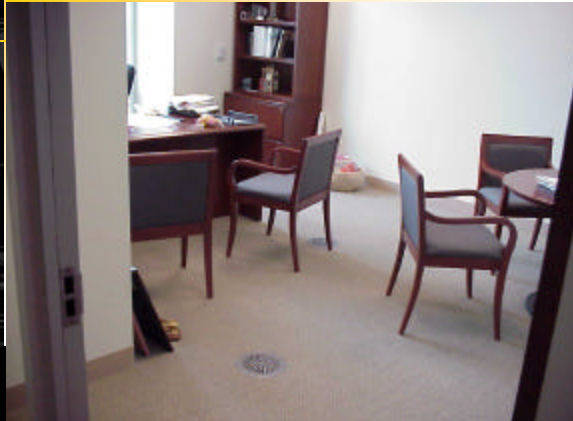


Woodfield Preserve Office Park

- 2001 – Occupied
- 600,000 sq ft
- Schaumburg, IL

Carrollini
A Neace Tech Company

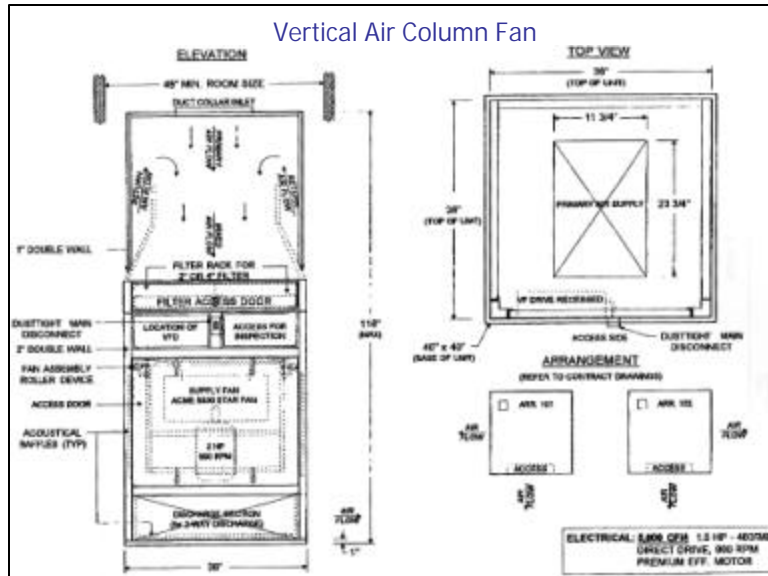
Woodfield Preserve Office Park



Woodfield Preserve Office Park



Vertical Air Column Fan



Woodfield Preserve Office Park



Woodfield Preserve Office Park



Carroll
A Service Tech Company

Woodfield Preserve Office Park



Carroll
A Service Tech Company

Woodfield Preserve Office Park



Carroll
A New York Company



An Energy Efficiency Workshop & Exposition
Palm Springs, California

Underfloor Power & Air

Douglas Mass, PE

June 3, 2002

June 2 - 5, 2002

www.energy2002.ee.doe.gov